

# SOME ASPECTS OF STOCHASTIC CALCULUS IN RELIABILITY

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## Abstract

In the last decades a very great interest was shown to the topics involving stochastic approximation procedures and their applications.

It is a true that in the present-day technology, reliability of equipment is increased by employing the method of *stand-by systems*, that is the introduction of extra components, units and entire assemblies. Thus, the purpose of the supplementary devices is to take over operation if the basic systems break down.

Dependind on the state of the stand-by equipment, can be distinguished loaded, nonloaded and partially loaded relief. In the case of loaded relief, the stand-by unit is in the same state as the operating unit and for this reason has the same intensity of breakdowns. In the partially loaded case, the stand-by device is loaded, but not so fully as the main equipment and for this reason has a different breakdown intensity. A stand-by unit that is not loaded does not, naturally, suffer breakdown.

Quite naturally, loaded and nonloaded relief are special cases of partially loaded relief.

On the other hand, the stochastic-approximation procedures require very little prior knowledge of the process and achieve reasonably good results. And for this reason such methods work satisfactorily in various applications. Many and very important results are obtained in particular by Solov'yev, Gnedenko, Venter and Gastwirth. For example we can consider a *system* or *item*, with a *life time* that has the distribution function  $F(t)$ , and which is inspected at times  $t_1, t_2, \dots$ . Now, if inspection reveals that the system is inoperative, it is repaired or replaced. Nothing is done otherwise. So, a general problem is to choose the inspection plan, that is to say the sequence  $t_1, t_2, \dots$  in an optimal way in a suitable sense. A criterion of optimality is defined by Venter and Gastwirth which have proved that a stochastic-approximation plan satisfies the criterion.

In this paper we refer to such problems and finally two applications involving the Onsager-Machlup operator are discussed.